Published in final edited form as:

Subst Use Misuse. 2020 ; 55(2): 261–270. doi:10.1080/10826084.2019.1664589.

Tobacco Industry Marketing Exposure and Commercial Tobacco Product Use Disparities among American Indians and Alaska Natives

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Abstract

Background: Non-Hispanic American Indians and Alaska Natives (NH AI/AN) have the highest commercial tobacco use (CTU) among U.S. racial/ethnic groups. Tobacco marketing is a risk factor, however few studies examine it among NH AI/AN.

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Conflict of Interests

None declared.

Data sharing statement

This paper was a secondary data analysis using the PATH Restricted Use Files. Access to the data is available to approved researchers through the National Addiction & HIV Data Archive Program (<https://www.icpsr.umich.edu/icpsrweb/NAHDAP/series/00606>).

Objective: We identified prevalence of tobacco industry marketing exposure and correlates of CTU among NH AI/AN compared to other racial/ethnic groups.

Methods: Data were from wave 1 (2013-2014; N=32,320) of the Population Assessment of Tobacco and Health Study, analyzing self-reported exposure to tobacco ads from stores, tobacco package displays, direct mail and email marketing. Correlates of CTU were identified and interactions between racial/ethnic groups and tobacco marketing were assessed.

Results: NH AI/AN (n=955) had a higher prevalence of exposure to retail tobacco ads (64.5% vs 59.3%; $p<0.05$), mail (20.2% vs.14.3%; $p<0.001$) and email (17.0% vs.10.6%; $p<0.001$) marketing than NH Whites (n=19,297). Adjusting for tobacco use and related risk factors, exposure to email marketing remained higher among NH AI/AN than NH Whites. Interactions between racial/ethnic groups and marketing exposures on CTU were non-significant. CTU was higher among NH AI/AN than NH Whites and among adults who reported exposure to tobacco ads, mail, and email marketing

Conclusions/Importance: There is higher tobacco marketing exposure in stores and via mail for NH AI/AN. Email marketing exposure was higher, even after controlling for tobacco-related risk factors. The tobacco industry may be targeting NH AI/AN through emails, which include coupons and other marketing promotions. Culturally-relevant strategies that counter-act tobacco industry direct marketing tactics are needed to reduce disparities in this population.

Keywords

American Indians/Alaska Natives; Tobacco Use; Smoking; Tobacco Marketing; Racial/Ethnic Disparities

INTRODUCTION

Non-Hispanic American Indians and Alaska Natives (NH AI/AN) have the highest prevalence of commercial cigarette smoking among racial/ethnic groups in the United States, with approximately 32% of NH AI/AN adults reporting every day or some-day cigarette smoking in 2016, compared with 17% of NH White adults (Jamal et al., 2018). Prevalence of other commercial tobacco product use, such as smokeless and pipe tobacco, are also significantly higher among NH AI/AN than among other racial/ethnic groups combined (Odani, Armour, Graffunder, Garrett, & Agaku, 2017). The marked disparity in commercial tobacco use among NH AI/AN is similar to other Indigenous populations around the world, such as First Nations, Inuit, and Metis in Canada (Maddox et al., 2018), Maori in New Zealand (Ball, Stanley, Wilson, Blakely, & Edwards, 2016), and Aboriginal and Torres Strait Islander populations in Australia (Statistics, 2017), resulting in the high rates of tobacco-related disease and mortality from cancers, respiratory and cardiovascular diseases observed among these populations (Espey et al., 2014; Martinez et al., 2016; Mowls, Campbell, & Beebe, 2015).

Social, cultural, historical, and regulatory factors may contribute to the higher prevalence of commercial tobacco use among NH AI/AN, including poverty, lack of access to healthcare, low education/SES, social norms and historical uses of tobacco as a sacred plant (Mowery et al., 2015; Soto, Baezconde-Garbanati, Schwartz, & Unger, 2015; Unger et al., 2003; Unger,

Soto, & Baezconde-Garbanati, 2006; Unger, Soto, & Thomas, 2008; US National Cancer Institute, 2017). Cultural and Tribal values surrounding traditional uses of tobacco may conflict with mainstream commercial tobacco prevention and cessation efforts (Kunitz, 2016). Additionally, NH AI/AN have limited culturally-relevant smoking cessation resources compared to the resources for smokers in other racial/ethnic groups (U.S. Department of Health and Human Services, 1998). Many NH AI/AN living on Tribal lands are not protected by smoke-free laws and tobacco taxes implemented at the state level because Federally-recognized Tribes exercise sovereignty and state laws have no jurisdiction on Tribal land (Lempert & Glantz, 2018; U.S. Department of Health and Human Services, 1998).

Another factor contributing to high rates of commercial tobacco use in this population may be tobacco industry marketing. Marketing contributes to smoking and use of other commercial tobacco and nicotine products in both adolescents and adults (Lovato, Linn, Stead, & Best, 2003; Moran et al., 2017; National Institutes of Health, 2008; Rob McConnell, Low, & Liu, 2018; US Department of Health Human Services, 2012). However, virtually no epidemiologic evidence exists to examine whether there is higher prevalence of tobacco marketing aimed at NH AI/AN compared to other racial/ethnic groups or whether tobacco marketing affects AI/AN differently than other groups. The tobacco industry has been misappropriating AI/AN culture since the 1930s and using AI/AN images and symbols to associate commercial tobacco products with stereotypes of AI/AN to exploit sacred tobacco (D'Silva, O'Gara, & Villaluz, 2018). Tobacco industry tactics aimed at increasing commercial tobacco sales to AI/AN include marketing products at Tribal events, giving out free products, using the Tribe's sovereign status to sell cheaper tobacco products in Tribal land retail stores, and persuading Tribal leadership to weaken tobacco control policies and youth smoking prevention efforts (Lempert & Glantz, 2018). For example, tobacco companies used tobacco price reductions, coupons, and development of alliances with Tribal leadership to undermine protections that might be more accessible to other racial/ethnic groups (Lempert & Glantz, 2018).

Research on the association of tobacco marketing to tobacco use disparities among NH AI/AN can inform tobacco control policies and health communication strategies among the diverse Tribal nations as well as non-US Indigenous populations. The primary aim of the current study was to determine the prevalence of exposure to tobacco industry marketing among NH AI/AN, NH Whites, and other racial/ethnic groups, and to determine whether exposure to tobacco marketing was higher among NH AI/AN after controlling for tobacco use itself and known risk factors for tobacco use, such as poverty status, that are not specific to the NH AI/AN population. The secondary aim of this study was to examine correlates of current tobacco use and whether exposure to tobacco marketing is differentially associated with commercial tobacco use among NH AI/AN than other racial/ethnic groups. We hypothesized that NH AI/AN will have higher exposure to pro-tobacco marketing, even after controlling for confounding variables, and that exposure to pro-tobacco marketing will be more strongly associated with current tobacco use in NH AI/AN versus NH Whites.

METHODS

Data Source

Data were from the Population Assessment of Tobacco and Health (PATH) Study. PATH is a nationally representative, longitudinal cohort study conducted by the National Institute on Drug Abuse and the Food and Drug Administration, Center for Tobacco Products (Hyland et al., 2017). Analyses were conducted on the PATH Wave 1 Adult Survey (N=32,320) Restricted-Use File (United States Department of Health and Human Services (USDHHS), National Institutes of Health (NIH), National Institute on Drug Abuse (NIDA), Food and Drug Administration (FDA), & Center for Tobacco Products (CTP), 2017-04-27). While subsequent waves of the PATH were available at the time of data analysis, data was restricted to Wave 1 due to the concern that loss to follow-up in subsequent waves would limit the sample size of AI/AN respondents. Wave 1 was conducted from September 2013 to December 2014. Address-based, area-probability sampling was used for recruitment. PATH uses audio computer-assisted self-interviews in English and Spanish to collect detailed self-report information such as tobacco use patterns, demographics, and pro-tobacco marketing exposure. Sampling weights are used to account for the different probabilities of selection, non-response and possible deficiencies in the sampling frame such as under-coverage of certain population groups. Variance estimation procedures were used to account for sampling design factors such as stratification and clustering. Appropriate use of sampling weights and variance estimation results in estimates that are representative of the civilian, noninstitutionalized U.S. population. The weighted response rate for the household screener was 54%. Among households that were screened, the weighted response rate for the Adult Survey was 74%. Additional information on the PATH study design, sampling methods, and weighting are available elsewhere (Hyland et al., 2017; USDHHS et al., 2017-04-27). This study was reviewed and approved by the University [identifier temporarily removed for blind review] institutional review board.

Measures

Racial/ethnic groups—All respondents were asked ‘Are you Hispanic, [Latinol Latina], or of Spanish origin?’ and ‘What is your race?’. Previous epidemiologic studies examining tobacco use and subsequent disease among AI/AN have included AI/AN who were non-Hispanic (NH); while, AI/AN who were Hispanic are classified as Hispanics (Cobb, Espey, & King, 2014; Espey et al., 2014; Jamal et al., 2018). Respondents who reported being NH and AI/AN race, either alone or in combination with more races were considered NH AI/AN in the present analysis. Other racial/ethnic groups in the present study were the following: NH White only, NH Black or African American (AA) only, NH Asian only, NH other (includes respondents who were Native Hawaiians/Pacific Islanders and of multi-race but not AI/AN) and Hispanic (any race). Only respondents (n=562) who were missing for race/ethnicity or refused to respond to questions on race/ethnicity were excluded. As a result, the analytic sample for this study was n=31,758.

Tobacco Industry Advertising and Marketing Exposure—All respondents, regardless of tobacco use, were asked the following questions to assess exposure to tobacco industry advertising and marketing: ‘In the past 6 months, since [MONTH / YEAR], have

you noticed tobacco ads or promotions on store windows or inside stores where tobacco is sold?’ (yes/no); ‘In the past 6 months, since [MONTH / YEAR], have you received an e-mail message with promotions or coupons for cigarettes or tobacco products?’ (yes/no); ‘In the past 6 months, since [MONTH / YEAR], have you received promotions or coupons for cigarettes or tobacco products in the mail?’ (yes/no); ‘In the past 30 days, have you seen cigarette or other tobacco packages being displayed, including on shelves or on the counter?’ (yes/no). These four measures were analyzed separately due to differences in time periods of recall (6 months versus 30 days) and so that the individual impact of each measure on current tobacco use status could be assessed.

Current Established Tobacco Use—All respondents were asked about their use of the following tobacco products: cigarettes, e-cigarettes, traditional cigars, cigarillos, filtered cigars, pipe, hookah, smokeless tobacco (i.e., loose snus, moist snuff, dip, spit, or chewing tobacco), snus pouches, and dissolvables. Respondents were provided a picture and a brief description of each product (except cigarettes) before being asked about the product. As defined in PATH (USDHHS et al., 2017-04-27), participants were considered current established cigarette smokers if they reported ever smoking a cigarette, having smoked more than 100 cigarettes in their lifetime, and currently smoked some days or every day. For all other tobacco products, participants were considered a current established user if they met the following criteria for a given product: ever used the product and used it fairly regularly and currently used it some or every day. Any respondent who met the criteria for current established use of at least one tobacco product was considered a current tobacco user in the present study.

Covariates—We examined and controlled for individual-level risk factors for tobacco use that could potentially confound the association between AI/AN status and tobacco marketing exposure or the association between tobacco marketing exposure and tobacco use. These factors included: age (continuous), gender (male, female), urban or non-urban residence based on the 2010 urban area designation of the respondent’s census tract, poverty status based on annual household income and the USDHHS poverty guidelines (below poverty level [$< 100\%$ of poverty guideline], at or near poverty level [$100\text{--}199\%$ of poverty guideline], at or above twice poverty level [$\geq 200\%$ of poverty guideline]); educational attainment (less than high school (HS), HS graduate/GED, some college [no degree]/ associates degree/bachelor’s degree/advanced degree), and living with tobacco user defined as someone living with the respondent who currently uses any form of tobacco (yes/no).

Statistical Analysis

All analyses were conducted in SAS Version 9.4 (SAS Institute, Inc.) in 2018. Appropriate survey procedures and sampling weights were used so that estimates represent the U.S. adult population. As suggested by the PATH Study (Hyland et al., 2017), variances were estimated by the balanced repeated replication method (McCarthy, 1969), with Fay’s adjustment set to 0.3 to increase estimate stability (Judkins, 1990).

Data were summarized descriptively via weighted means or proportions. Weighted odds ratios and 95 % confidence intervals (CI), via the Wilson (score) method, were calculated

via multivariable logistic regression to examine the relationship between racial/ethnic groups and each tobacco marketing exposure measure adjusted for age, gender, education, poverty status, current established tobacco use, living with a tobacco user, and urban residence. NH Whites were used as the reference group since they represent the majority of the US population and are the most commonly used referent group in studies of racial/ethnic disparities.

A step-wise modeling approach using three multivariable logistic regression models was used to examine correlates of current established tobacco use: Model 1) racial/ethnic group as the only exposure; Model 2) racial/ethnic group and covariates; Model 3) racial/ethnic group, covariates, tobacco marketing exposure measures, and interaction terms between racial/ethnic group and each tobacco marketing exposure measure. We chose this modelling approach as it allows for factors commonly associated with tobacco use to be controlled for in analyses. Due to the lack of data examining pro-tobacco marketing among NH AI/AN, associations between tobacco marketing exposure and current tobacco use among NH AI/AN respondents exclusively (i.e. excluding all other racial/ethnic groups) were assessed. A $p < 0.05$ was used to account for statistical significance.

RESULTS

Sample characteristics

The majority of the US adult population had some college education or more, lived at or above twice the poverty level, and resided in an urban area. Nearly one-quarter (23%) of adults were current established tobacco users (Table 1). Compared to NH Whites, NH AI/AN were younger, less educated, and more likely to have an annual household income below the poverty level. A greater proportion of NH AI/AN than NH Whites were current tobacco users and lived with a household member who currently used tobacco products.

Tobacco marketing exposure among NH AI/AN and other racial/ethnic groups

As shown in Figure 1, a significantly higher proportion (unadjusted) of NH AI/AN than NH Whites reported having noticed tobacco ads on store windows or inside stores in the past 6 months (64.5% versus 59.3%; $p = 0.0233$), received email marketing in the past 6 months (17.0% vs. 10.6%; $p < .0001$), and received mail marketing in the past 6 months (20.2% vs. 14.3%; $p < .0001$). Comparable proportions of NH AI/AN and NH Whites reported having seen cigarette or other tobacco packages displayed at stores (76.3% vs. 73.1%; $p = 0.2321$). Regarding the other racial/ethnic groups, NH Blacks had significantly higher prevalences of all four tobacco marketing exposure measures when compared with NH Whites. NH Asians and Hispanics had lower prevalences of all or the majority of the tobacco marketing exposure measures compared with NH Whites. NH Other race respondents had comparable prevalences of the majority of the tobacco marketing exposure measures compared with NH Whites. Figure 1 also shows that the prevalence of the store-related tobacco marketing measures (having noticed tobacco ads on store windows/inside stores and seen cigarette or other tobacco packages displayed at stores) were higher than direct marketing via mail or email.

Compared to NH Whites, NH AI/AN had significantly higher adjusted odds (aOR: 1.36; 95% CI: 1.11, 1.66) of having received email marketing (Table 2). There was no difference between NH AI/AN and NH Whites in the adjusted odds of having noticed tobacco ads (aOR: 1.14; 95% CI: 0.90, 1.44), having received mail marketing (aOR: 1.17; 95% CI: 0.98, 1.40), or having seen cigarette or other tobacco packages displayed at stores (aOR: 1.18; 95% CI: 0.88, 1.57). NH Blacks had significantly higher adjusted odds than NH Whites of having received email marketing (aOR: 1.17; 95% CI: 1.04, 1.31) or having noticed tobacco ads (aOR: 1.19; 95% CI: 1.07, 1.32). NH Blacks had significantly lower adjusted odds than NH Whites of having seen cigarette or other tobacco packages displayed at stores (aOR: 0.82; 95% CI: 0.74, 0.90). NH Asians had significantly lower adjusted odds than NH Whites of all four tobacco marketing exposure measures. NH Other race did not differ from NH Whites in the adjusted odds of any of the tobacco marketing exposure measures. Hispanics had a significantly lower adjusted odds than NH Whites of having received mail marketing (aOR: 0.66; 95% CI: 0.57, 0.77) and having seen cigarette or other tobacco packages displayed at stores (aOR: 0.60; 95% CI: 0.54, 0.67).

Current established tobacco use and tobacco marketing exposure

The odds of current established tobacco use in model 1 were significantly higher among NH AI/AN (OR: 1.80; 95% CI: 1.47, 2.21), lower among NH Asians (OR: 0.40; 95% CI: 0.33, 0.49), and lower among Hispanics (OR: 0.63; 95% CI: 0.57, 0.69) than NH Whites (Table 3). Neither NH Blacks nor NH Other race respondents differed from NH Whites in the odds of current established tobacco use. After adjustment for covariates associated with tobacco use in model 2, the odds of current tobacco use were significantly higher among NH AI/AN (aOR: 1.41; 95% CI: 1.11, 1.79) than NH Whites; while the odds of current established tobacco use were significantly lower among NH Blacks (aOR: 0.75; 95% CI: 0.68, 0.84), NH Asians (aOR: 0.37; 95% CI: 0.30, 0.46), and Hispanics (aOR: 0.38; 95% CI: 0.34, 0.43) than NH Whites.

In model 3, interactions between racial/ethnic group and each of the tobacco marketing exposure measures were tested to determine whether the strength of the association between tobacco marketing exposure and tobacco use varied across racial/ethnic groups. None of the interaction terms were statistically significant and were removed from the analysis. Thus, the main effects of racial/ethnic group and tobacco marketing exposure are presented below.

The odds of current established tobacco use after adjustment for the covariates and tobacco marketing exposures were significantly higher among NH AI/AN (aOR: 1.35; 95% CI: 1.07, 1.69) than NH Whites. For all of the other racial/ethnic groups except for NH Other race, the adjusted odds of current established tobacco use were significantly lower when compared with NH Whites. The odds of current established tobacco use were significantly higher among adults who reported having noticed tobacco ads (aOR: 1.10, 95% CI: 1.03, 1.17), received an email message with promotions or coupons for cigarettes or tobacco products (aOR: 1.37, 95% CI: 1.22, 1.55), and received promotions or coupons in the mail for cigarettes or tobacco products (aOR: 2.93, 95% CI: 2.61, 3.28). The relationship between having seen cigarettes or other tobacco packages displayed at stores and current established tobacco use was not significant. Regarding the covariates, younger age, male gender, lower

education, poverty, living with a current tobacco user, and urban residence were significantly associated with a higher odds of current established tobacco use.

Associations between tobacco marketing exposure and current established tobacco use, adjusted for the covariates, among NH AI/AN only were assessed (Supplementary Table 1). The adjusted odds of current established tobacco use were significantly higher among NH AI/AN who reported having received mail marketing (aOR: 2.65, 95% CI: 1.56, 4.49). The adjusted relationships between having received email marketing and current established tobacco use (aOR: 1.79, 95% CI: 0.97, 3.29), having seen cigarettes or other tobacco packages displayed at stores and current established tobacco use (aOR: 1.32, 95% CI: 0.72, 2.43) and having noticed tobacco ads and current established tobacco use among NH AI/AN were non-significant (aOR: 0.83, 95% CI: 0.46, 1.52).

DISCUSSION

This is the first study to report the prevalence of tobacco marketing exposure among NH AI/AN and other major US racial/ethnic groups. The results indicate that NH AI/AN had a higher prevalence of noticing tobacco advertising inside or outside stores, and receiving direct mail and email marketing, compared to NH Whites. Since risk factors for tobacco use such as poverty as well as tobacco use itself are higher among NH AI/AN than NH Whites, we conducted analyses controlling for these factors. In adjusted analyses, tobacco industry email marketing remained higher among NH AI/AN than NH Whites. This finding also was found among NH Blacks who have been targeted by the tobacco industry for decades, particularly in regards to menthol cigarette marketing (Cruz, Wright, & Crawford, 2010; Gardiner, 2004). Prior analysis of tobacco industry documents illustrates how tobacco companies intentionally target NH AI/AN and suggests that these tactics likely contribute to the high tobacco use and subsequent disease observed among this population (Lempert & Glantz, 2018). Our results suggest that the tobacco industry may be targeting NH AI/AN through emailed coupons and promotions.

An important finding of this study was the observation that the racial/ethnic group did not moderate the relationship between tobacco marketing exposure and current tobacco use. One other study examined the association between pro-tobacco marketing exposure and tobacco use and explicitly looked for racial/ethnic group variation (including Whites, Blacks, Asians, Latinos, Multiethnic, and Other) in the strength of those associations (Weiss et al., 2006). Similar to the present study, exposure to pro-tobacco advertisements in stores was associated with smoking susceptibility and the strength of this relationship did not differ by racial/ethnic group (Weiss et al., 2006). Thus, anti-tobacco efforts to combat the effects of tobacco industry marketing are universally needed, but they may need to target the context in which the marketing takes place.

NH AI/AN had the highest prevalence of tobacco use among the racial/ethnic groups studied – a finding documented in prior research (Cobb et al., 2014; Espey et al., 2014; Jamal et al., 2018; Odani et al., 2017). The results presented here also support the literature demonstrating that low socio-economic status (SES), including poverty status and education (Hiscock et al., 2012), rural residence (Roberts et al., 2016), and male gender (Wang et al.,

2018) are associated with current tobacco use. To determine if risk factors for tobacco use, as well as tobacco use itself, are explaining the higher prevalence of tobacco marketing exposure among NH AI/AN, we conducted analyses adjusting for these factors. In adjusted analyses, NH AI/AN was associated with higher current tobacco use compared to NH Whites. This is opposite of what was observed among the other racial/ethnic groups (i.e., lower tobacco use than NH Whites). Thus, our results suggest that there likely are risk factors for tobacco use specific to the AI/AN population that were not examined in the present study. These other risk factors for tobacco use could include social norms, uses of tobacco for traditional or ceremonial purposes, and limited culturally-tailored smoking cessation resources.

Among all race/ethnic groups, exposure to tobacco marketing in or around stores was more prevalent than exposure via direct marketing. This finding is supported by the fact that tobacco companies spend more on point-of-sale advertising than any other form of advertising, including direct marketing, in the US (US Federal Trade Commission, 2018). Unlike tobacco advertisements in stores that are universally seen by all store customers, direct marketing is used by tobacco companies to reach their consumers while avoiding tobacco control, public health, and regulators (Brock, Carlson, Moilanen, & Schillo, 2016). The magnitude of the relationship between mail marketing and tobacco use (aOR: 2.93) and email marketing and tobacco use (aOR: 1.37) was higher than that of the point-of-sale marketing and tobacco use (aOR: 1.10). Both mail and email marketing require the recipient to join the tobacco company's internal database, such as through entering into sweepstakes, redeeming a coupon, or signing up on the company's website (Morimoto & Chang, 2006). These direct marketing strategies are likely to be particularly effective since they can include messages and give-aways that may be matched to demographics of the recipients, offer coupons to reduce the costs of tobacco products, and persist even when the recipient tries to stop smoking, thus impeding cessation (Brock et al., 2016). The higher magnitude of the association between direct mail marketing with tobacco use may be a result of the quality of the materials being used as well as their tangibility and durability, while email marketing may be less effective due to its visibility after initial receipt and/or the frequency of emails being viewed as intrusive (Morimoto & Chang, 2006). Countermarketing strategies can help smokers build awareness and resistance to these methods and take steps to unsubscribe from industry emails.

There are limitations to this study that warrant discussion. First, we were limited to the measures assessed in the PATH study. The tobacco marketing exposure measures did not assess the frequency of exposure to tobacco marketing or its content. Also, tobacco use measures do not assess traditional tobacco use, which is common among some but not all Tribes. Second, we examined tobacco use as a composite measure. Further, consideration of how specific tobacco products are being marketed to this population is needed. Also, we recognize that a nationally-representative dataset does not allow for an examination of NH AI/AN by regions or Tribes. Heterogeneity in tobacco use exists across AI/AN. For example, while the smoking prevalence is higher among NH AI/AN than NH Whites at a national level and most regions, the prevalence is lower among NH AI/AN than Whites in the Southwest region of the US (AZ, CO, NV, NM, and UT) (Cobb et al., 2014). Future analyses would benefit from a focus on regional variation in tobacco industry marketing

among NH AI/AN and an examination of trajectories of commercial tobacco use related to marketing exposure. Lastly, neighborhood tobacco outlet density may explain racial/ethnic differences in exposure to tobacco marketing and should be explored in future studies.

Public Health Implications

This US nationally representative study showed that higher exposure to tobacco industry marketing tactics in stores and via direct mail in NH AI/AN compared with NH Whites may be due to higher tobacco use and tobacco-related risk factors, such as poverty status, among NH AI/AN. However, exposure to tobacco industry marketing via email remained significant after controlling for these factors, suggesting that the tobacco industry may be targeting NH AI/AN through email marketing. This study also demonstrated that tobacco marketing is likely a similarly effective driver of commercial tobacco use across racial/ethnic groups in the US. Culturally-relevant public health strategies that counteract tobacco industry marketing tactics aimed at NH AI/AN are needed to help reduce commercial tobacco use disparities in this population. A recent systematic review examining anti-tobacco media messages among Indigenous people across the world, including NH AI/AN, found that culturally-tailored messages for Indigenous people are not only preferred by Indigenous people but also effectively change knowledge, attitudes, and tobacco use behavior (Gould, McEwen, Watters, Clough, & van der Zwan, 2013). An example of a culturally-tailored strategy is the National Native Network's (NNN) efforts. The NNN seeks to serve all 567 federally recognized Tribes and urban AI/AN communities with a national network of Tribes, Tribal organizations and health programs working to reduce commercial tobacco use among AI/AN (National Native Network). Due to the diversity of AI/AN Tribes, Tribal leaders and health officials may want to consider developing their own strategies and relevant policies that are uniquely tailored to their Tribal community such as the discouragement of commercial tobacco use while respecting the use of traditional tobacco and protecting health (Chief et al., 2016). The Centers for Disease Control and Prevention has several resources, including manuals titled 'Designing and Implementing an Effective Tobacco Counter-Marketing Campaign' (Centers for Disease Control Prevention, 2003) and 'The Health Communicator's Social Media Toolkit' (Centers for Disease Control and Prevention, 2011). These materials may be helpful for Tribal communities who are interested in developing their own tobacco counter-marketing strategies, relevant educational materials, and future related policies.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

This study was completed as part of the collaborative research being conducted by the National Institutes of Health (NIH) and Food and Drug Administration (FDA) Tobacco Centers of Regulatory Science (TCORS) Vulnerable Populations Workgroup. This study was supported by the NIH, National Research Service Award T32 DA007097 from the National Institute on Drug Abuse for Carroll; grant number P50CA180905 and U54 CA180905 from the National Cancer Institute (NCI) and the Food and Drug Administration (FDA) Center for Tobacco Products (CTP) for Soto, Cruz, Unger, Lienneman and Baezconde-Garbanati; grant number T32CA009492-29 from NCI for Lienneman; grant number U54CA189222 under a subcontract to Westat from NCI, FDA and the Center for Evaluation and Coordination of Training and Research (CECTR) in Tobacco Regulatory Science for Rose; and

grant number P50 CA180907 from the NCI and FDA CTP for Huang. The content is solely the responsibility of the authors and does not necessarily represent the official views of the NIH or the FDA.

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Figure 1. Unadjusted weighted prevalence estimates and 95% confidence intervals for tobacco industry marketing exposure by race/ethnicity among adult PATH Wave 1 participants; Compared to NH Whites * $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$.

Known tobacco-use-related risk factors and current tobacco use overall and by race/ethnicity among adult PATH Wave 1 participants

Table 1.

	Overall N=31,758	NH AI/AN n=955	NH Whites n=19,297	NH Blacks n=4,496	NH Asians n=874	Hispanics n=5,536	NH Other n=600
Age (years), μ	46.48	45.80 ***	48.78	44.33 ***	40.57 ***	40.79 ***	35.64 ***
Male gender, %	48.03	49.08	48.57	47.34	49.70	45.55 ***	48.48
Education, %							
Less than high school graduate/GED	16.43	24.11 ***	11.95	20.78 ***	6.31 ***	35.48 ***	12.81
High school graduate/GED	24.25	21.23	23.67	29.18	12.20	27.37	25.61
Some college or more	59.32	54.66	64.38	50.04	81.49	37.15	61.57
Poverty status, %							
Below poverty level	24.97	31.48 ***	16.14	42.05 ***	22.82 ***	49.84 ***	34.01
At or near poverty level	22.37	26.17	21.39	26.11	16.68	25.37	21.42
At or above twice poverty level	52.66	42.34	62.48	31.84	60.50	24.79	44.57
Resides in urban area, %	79.12	72.83	72.95	87.62 ***	97.00 ***	93.50 ***	92.18
Tobacco user in household, %	25.63	31.28 *	25.73	30.05 ***	19.19 **	22.83 **	37.01
Current established tobacco user, %	23.92	38.13 ***	25.32	27.07	11.94 ***	17.64 ***	30.10

§ Significantly different than Whites;

* P<0.05;

** P<0.01;

*** P<0.001.

Table 2.

Associations between race/ethnicity and tobacco industry marketing exposure among adult PATH wave 1 participants

Race/ethnicity	Noticed tobacco ads/promotions on store windows or inside stores where tobacco is sold in past 6 months	Received an e-mail message with coupons for cigarettes or tobacco products in the past 6 months	Received promotions or coupons in the mail for cigarettes or tobacco products in the past 6 months	Saw cigarette or other tobacco packages displayed inside or outside stores where tobacco products are sold in the past 30 days
	OR (95 % CI)	OR (95 % CI)	OR (95 % CI)	OR (95 % CI)
NH Whites	1.0	1.0	1.0	1.0
NH AI/AN	1.14 (0.90, 1.44)	1.36 (1.11, 1.66)**	1.17 (0.98, 1.40)	1.18 (0.88, 1.57)
NH Blacks	1.19 (1.07, 1.32)**	1.17 (1.04, 1.31)*	1.00 (0.87, 1.14)	0.82 (0.74, 0.90)***
NH Asians	0.55 (0.46, 0.66)***	0.53 (0.36, 0.78)**	0.35 (0.23, 0.54)***	0.44 (0.37, 0.53)***
NH Other	1.10 (0.83, 1.47)	0.84 (0.59, 1.20)	0.92 (0.65, 1.29)	0.76 (0.50, 1.15)
Hispanics	1.00 (0.90, 1.12)	0.88 (0.76, 1.03)	0.66 (0.57, 0.77)***	0.60 (0.54, 0.67)***

*Odds ratios are adjusted for age, gender, education, poverty status, current tobacco use, living with a tobacco use, and urban/rural; Compared to Whites

* P<0.05;

** P<0.01;

*** P<0.001.

Table 3.

Associations between race/ethnicity, tobacco marketing exposure, known tobacco-use-related risk factors and current tobacco use among adult PATH Wave 1 participants

Covariate	Model 1 OR (95% CI)	Model 2 OR (95% CI)	Model 3 OR (95% CI)
Race/ethnicity			
NH Whites	1.0	1.0	1.0
NH AI/AN	1.80 (1.47, 2.21) ***	1.41 (1.11, 1.79) **	1.35 (1.07, 1.69) *
NH Blacks	1.06 (0.96, 1.17)	0.75 (0.68, 0.84) ***	0.76 (0.69, 0.84) ***
NH Asians	0.40 (0.33, 0.49) ***	0.37 (0.30, 0.46) ***	0.45 (0.36, 0.55) ***
NH Other	1.23 (0.98, 1.53)	0.82 (0.63, 1.06)	0.85 (0.65, 1.12)
Hispanics	0.63 (0.57, 0.69) ***	0.38 (0.34, 0.43) ***	0.42 (0.38, 0.47) ***
Age (continuous)		0.981 (0.979, 0.983) ***	0.982 (0.980, 0.984) ***
Gender			
Female		1.0	1.0
Male		2.11 (1.96, 2.27) ***	2.23 (2.07, 2.41) ***
Education			
Less than high school/GED		1.45 (1.29, 1.64) ***	1.47 (1.29, 1.67) ***
High school/GED		1.0	1.0
Some college or more		0.72 (0.65, 0.80) ***	0.72 (0.65, 0.80) ***
Poverty status			
Below poverty level		1.74 (1.58, 1.91) ***	1.67 (1.51, 1.83) ***
At or near poverty level		1.62 (1.51, 1.74) ***	1.54 (1.43, 1.65) ***
At or above twice poverty level		1.0	1.0
Tobacco user in household			
No		1.0	1.0
Yes		3.74 (3.44, 4.07) ***	3.31 (3.04, 3.60) ***
Urban residence			
No		1.0	1.0
Yes		1.11 (1.02, 1.21) *	1.10 (1.02, 1.20) *
Noticed tobacco ads/ promotions on store windows/ inside stores where tobacco is sold in the past 6 months			
No			1.0
Yes			1.10 (1.03, 1.17) **
Received an e-mail message with promotions or coupons for cigarettes or tobacco products in the past 6 months			
No			1.0
Yes			1.37 (1.22, 1.55) ***

	Model 1	Model 2	Model 3
Covariate	OR (95% CI)	OR (95% CI)	OR (95% CI)
Received promotions or coupons in the mail for cigarettes or tobacco products in the past 6 months			
No			1.0
Yes			2.93 (2.61, 3.28) ***
Saw cigarette/other tobacco packages displayed inside or outside shops or stores where tobacco products are sold in the past 30 days			
No			1.0
Yes			1.08 (0.99, 1.17)

*
P<0.05;

**
P<0.01;

P<0.001.